

**Kaylee M. Cunningham, Jeffrey J. Powers, Robert A. Lefebvre**

*University of Florida*

American Nuclear Society 2019 Winter Meeting

**Modeling the IFR-1 Metal Fuel Experiment in Bison through the NEAMS Workbench**

The United States Department of Energy Office of Nuclear Energy (DOE-NE) Versatile Test Reactor (VTR) project is studying a possible new fast spectrum test reactor. The mission of the VTR would be to further the development and deployment of nuclear energy technologies by providing a modern, fast-spectrum facility for testing advanced nuclear materials, sensors, instruments, and fuels. The proposed VTR driver fuel concept is a uranium-plutonium-zirconium (UPuZr) ternary alloy metallic fuel clad in HT9. In 1985, the Integral Fast Reactor (IFR)-1 experiment was performed in the Fast Flux Test Facility (FFTF). There were three IFR-1 fuel slug compositions: U-10Zr, U-8Pu-10Zr, and U-19Pu-10Zr. All of these were clad in D9. The U-19Pu-10Zr fuel rods are of greatest interest to the VTR project. As a result, Oak Ridge National Laboratory (ORNL) recently used the Bison fuel performance code to model, simulate, and analyze a U-19Pu-10Zr IFR-1 fuel pin. Bison is a thermomechanical finite element code with material models and other capabilities that enable the study of how various types of nuclear fuel would perform under given operating conditions.